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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,332	10/26/2005	Ting Liu Carlson	17628.003US1	3516

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CARGILL, INCORPORATED
P.O. Box 5624
MINNEAPOLIS, MN 55440-5624

EXAMINER	
BADR, HAMID R	
ART UNIT	**PAPER NUMBER**
1794	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/527,332	CARLSON ET AL.	
	Examiner	Art Unit	
	HAMID R. BADR	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *RCE 8/6/209*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *29-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *29-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/6/2009 has been entered.

2. Claims 29-43 are being considered on the merits.

Claim Rejections – 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 29-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paul et al. (US 5,141,858; hereinafter R1) in view of Leathers et al. (US 5,702,942; hereinafter R2).

3. R1 discloses a method for producing oligodextrans for foodstuffs using glucosytransferase of *Leuconostoc mesenteroides (lactic acid bacterium)* strain B-1299. Sucrose is used as the donor molecule and maltose and other sugars as the acceptor molecule. (Abstract and col.2, lines 20 and 26-27).

4. R1 uses maltose as the acceptor molecule. Those of skill in the art know that maltose is a disaccharide composed of two glucose moieties. It is noted that maltose has free hydroxyl groups at positions 2, 3 and 6 which can accept a glucose from sucrose molecule by the action of the enzyme glucosysltransferase. It is also noted that the limitation glucansucrase as presently claimed is a general term for enzymes that can transfer glucose units from sucrose to acceptor molecules such as maltose. They include glucosyltransferases and dextransucrases.

5. R1 teaches that the highest yields of oligodextrans are obtained when the ratio of concentrations of sucrose to the acceptor molecule (e. g. maltose) is between 0.5 and 10. (Col. 3, line 67 – Col. 4, line 3).

6. R1 discloses that after the synthesis of the oligodextran, the fructose (generated from hydrolysis of sucrose) may be kept in the medium or it may be removed by chromatographic ion exchange method methods. (Col. 4, lines 39-41 and col.11, lines 42-44). It is obvious to one of ordinary skill in the art that a low glycemic index sugar substitute should have reduced assimilable sugars such as fructose and glucose.

7. R1 teaches that the oligodextrans produced by the invention are particularly resistant to enzymatic hydrolysis by glucohydrolase enzymes. This property makes them useful as fillers or extenders in sugar substitutes which are metabolizable by man only slightly on not at all (i.e. low glycemic index material). They may therefore be used in low calorie foodstuff formulations (Col. 2, lines 9-21).

8. R1 is silent regarding the alpha-1,3 and alpha-1,6 linkages in the synthesized product. R1 is also silent regarding the specific strain NRRL B-21297.

9. R2 discloses a mutant of *Leuconostoc mesenteroides* that produces a high proportion of alternan to dextran and a high proportion of alternansucrase to dextransucrase (Abstract).

10. R2 discloses that alternan and alternan derivatives have potential value as non-caloric, carbohydrate based soluble food additives in artificially sweetened foods (Col. 1, lines 33-35).

11. R2 teaches that alternans have alpha-1,3 and alpha-1,6 linkages between constituent glucose units (Fig. 1). It is noted that the alpha-1,3 and alpha-1,6 linkages alternate throughout the molecule.

12. R2 discloses that one of the mutants of *L. mesenteroides* obtained has been assigned the accession number NRRL B-21297 (Col. 9, lines 53-56). This strain is presently being claimed to be the source of the glucansucrase presently claimed.

13. R2 describes the enzymatic production of alternan using alternansucrase and sucrose. (Col. 13, Example 4)

14. The process of synthesizing an oligodextran through the use of a glucosyltransferse (glucansucrase) has been clearly disclosed by R1 using strain B-1299 as the enzyme source. While R1 teaches the glucansucrase reaction using sucrose as the donor and maltose as the acceptor molecules (and very importantly the ratio of donor to acceptor concentration), however, the enzyme source and the conditions employed by R1 will produce oligodextrans having α-1,2 linkages in addition to other products. The synthesis of oligoalternans through the reaction of donor (sucrose) and acceptor (maltose) when alternansucrase is used as the enzyme, with

the concomitant production of fructose, was known at the time the invention was made, therefore, the donor (sucrose)-acceptor (maltose) reaction as taught by R1 needed to be modified by employing an alternansucrase source to produce the type of carbohydrates having α.1-3 and α,1-6 linkages as presently claimed. R2 on the other hand discloses strain B-21297 as the source of the enzyme (alternansucrase) and clearly sets forth the advantage of using it to produce more of alternan-type carbohydrates.

15. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to follow the teachings of R1 and make a modification of those teachings by replacing the enzyme source with the enzyme source taught by R2. One would do so to make alternan-type at a higher concentration. Such carbohydrates are useful as low glycemic, low calorie sweeteners which can be used in food and beverages. Absent any evidence to contrary and based on the combined teachings of the cited references, there would be a reasonable expectation of success in making low glycemic index carbohydrates.

16. Claims 29-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kossmann et al. (WO 00/47727; hereinafter R3) in view of Leathers et al. (US 5,702,942; hereinafter R2).

3. R3 discloses methods for the preparation of alternan and related products using alternansucrase (glucansucrase) from *Leuconostoc mesenteroids*.

17. R3 discloses the percentage of α,1-3 and α,1-6 linkages in the alternan compounds. (page 4, last paragraph).

18. R3 discloses that in the presence of external acceptors, such as maltose, alternansucrase can catalyze the synthesis of D-glucan chains in which the glucose residues are predominantly alternatingly connected by α,1-3 and α,1-6 bonds and the synthesis of fructose. (page 4 two last lines to page 5; lines 1-3).

19. R3 discloses examples where sucrose or sucrose in the presence of maltose can be used in reactions involving alternansucrase. (page 45, In vitro preparation of alternan by means of protein extracts; page 53, Example 8, Example 9, page 54; Example 11).

20. R3 discloses the ratio of sucrose concentration to maltose concentration in reactions where maltose is used as the acceptor molecule. (Example 2, In vitro preparation of alternan by means of protein extracts).

21. While R3 is silent regarding the NRRL B-21297 strain as the source of enzyme, selecting NRRL B-21297 as the enzyme source, because of the production of a high concentration of alternansucrase, would have been obvious to an artisan.

22. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to follow the teachings of R3 and substitute the alternansucrase enzyme of R3 with the enzyme source of R2. One would do so to utilize a mutant producing a high concentration of alternansucrase for the production of low calorie sweeteners. Absent any evidence to contrary and based on the combined teachings of the cited references, there would be a reasonable expectation of success in making low glycemic index carbohydrates.

Response to Arguments

Applicants' arguments have been thoroughly reviewed. These arguments are not deemed persuasive.

1. Applicants argue that Paul (R1) does not teach the claimed process and that the combination of Paul and Leathers (R2) is an improper combination of references.

a. By referring to the claimed invention one finds that sucrose is being hydrolyzed by glucansucrase and the resulting glucose is being transferred to an acceptor molecule such as maltose. other technical features of claims 29-33 are the ratios of sucrose to maltose (8:1 to 10:1) and the presence of α, 1-3 and α, 1-6 linkages in the oligosaccharides produced.

In the course of sucrose hydrolysis, fructose is released because sucrose is made of glucose and fructose, the glucose is being transferred to maltose (the acceptor), therefore; fructose will increase in concentration. Claims 34-35 call for removal of this fructose, however, the removal is not complete because claim 35 requires that the sweetener may contain less that 50% fructose. Therefore it may contain 0-49.999% (any value below 50%) fructose.

Claims 36-38 disclose that the source of glucansucrase is *Leuconostoc mesentroids* (lactic acid bacteria) and that that the strains of interest are the designated bacterial strains of Northern Regional Research Laboratories (NRRL) including strains 1297, 1298 and 21297.

Claim 30 limits the glucansucrase enzyme to *Leuconostoc mesentroids* NRRL B-21297.

In claims 40-43, the sweetener and its applications in foods or beverages are being claimed.

A fair reading of Paul et al. (R1) teaches, one of skill in the art, of the bioconversion of sucrose to oligosaccharides using maltose as the acceptor molecule. However, the difference of what is taught by Paul and the presently claimed invention is that the presently claimed invention is directed to the synthesis of alternan (alternating α,1-3 and α, 1-6 linkages). The use of alternansucrase to synthesize alternan, using sucrose as the donor and maltose as the acceptor molecule was known at the time of invention, therefore using a microbial source which produces alternansucrase would have been obvious to an artisan. The specific strain of *Leuconostoc mesentroides* and the reaction conditions used by Paul could be modified by an artisan to synthesize alternan. The source of the enzyme from the specific strain being claimed (*L. mesenteroides*, NRRL B-21297) is disclosed by Leathers et al. (R2)

Therefore, since all limitations as presently claimed are met, combined teachings of the references make the presently claimed processes obvious and mixtures of carbohydrates produced according to these processes will be as presently claimed.

2. Applicants have tried to compare the presently claimed process with what is taught by Paul (R1) only.

a. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208

USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

However, note that while R2 does not disclose all the features of the present claimed invention, R2 is used as teaching reference, and therefore, it is not necessary for this secondary reference to contain all the features of the presently claimed invention, *In re Nievelt*, 482 F.2d 965, 179 USPQ 224, 226 (CCPA 1973), *In re Keller* 624 F.2d 413, 208 USPQ 871, 881 (CCPA 1981). Rather this reference teaches a certain concept, and in combination with the primary reference, discloses the presently claimed invention. The bioconversion of sucrose to alternan using maltose as the acceptor molecule was known at the time the invention, by the Applicants, was made. Therefore, selecting an enzyme source having a predominant alternansucrase activity for that matter, would have been obvious to an artisan.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HAMID R. BADR whose telephone number is (571)270-3455. The examiner can normally be reached on M-F, 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571) 272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hamid R Badr
Examiner
Art Unit 1794

/KEITH D. HENDRICKS/
Supervisory Patent Examiner, Art Unit 1794